

REMARKS/ARGUMENTS

Favorable consideration of this application in light of the following discussion is respectfully requested.

Claims 9, 32, 34, 36, 39 and 40 are presently pending in this application, no amendments being made herein.

In the outstanding Office Action, Claims 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Iwasaki et al. (U.S. Patent 6,477,038), in view of Koushima et al. (U.S. Patent 5,665,795); Claim 36 was rejected under 35 U.S.C § 103(a) as being unpatentable over Iwasaki et al. in view of Enomoto et al. (no reference number given); and Claims 32, 34, 39 and 40 were indicated as allowed.

First, Applicants acknowledge with appreciation the indication that Claims 32, 34, 39 and 40 have been allowed.

In addition, Applicants thank Examiner Dinh for the numerous telephone discussions wherein Applicants explained that the Office Action mailed May 14, 2008 cites a new reference to “Enomoto et al.” without providing an identification number for this cited reference. These discussion resulted in a new Office action dated November 6, 2008. However, the November 6th Office Action rejects Claim 36 as unpatentable over Enomoto et al., but again fails to provide an identification number for this cited reference. Applicants traverse this rejection below, and request that any forthcoming action provide a number citation to the “Enomoto et al.” so that Applicants can provide substantive discussion of the reference.

Applicants further note that the Amendment filed April 14, 2008 included an amendment to FIG. 5C, which shows an example of the island-in-sea structure within a detailed view of solder resist layer 14. In addition, the specification was amended to refer to FIG. 5C in describing this structure. The detailed view of solder resist layer 14 provided in

FIG. 5C is supported at least by Applicants' specification at page 16, lines 1-8. Therefore, the amendment to the drawings and specification do not raise an issue of new matter.

Applicants respectfully request that the Examiner acknowledge that the amendments to the drawings and specification are acceptable so that a formal drawing change can be submitted.

Turning now to the merits, Applicants' invention is directed to a multilayer printed circuit board having improved resistance to cracks and fractures. Multilayer printed circuit boards generally use a resin solder resist layer. Resins are generally known to have a large coefficient of thermal expansion such that the resin changes shape and size due to environmental temperature changes. The inventors have recognized that where a multilayer printed circuit board is affected by temperature change, physical changes in the resin solder resist layer can cause great stress on the board, thereby causing cracks and other damage to the board. Applicants invention addresses this issue.

Specifically, Claim 9, recites a multilayered printed circuit board including a conductor circuit and a resin insulating layer serially formed on a substrate in an alternate fashion and in repetition, and a solder resist layer formed as an outermost layer. The ***solder resist layer contains an elastomer component provided within at least one resin*** selected from the group consisting of a thermoplastic resin and a thermosetting resin, and the ***elastomer component is separated in micro-phase as to form an island-in-sea structure*** after curing in the solder resist layer. Claim 36 also includes this highlighted feature. As discussed in Applicants' specification, the elastomer component has a flexible feature to absorb shock and stress. Thus, providing an elastomer component in an "island-in-sea" structure within the resin solder resist can absorb and minimize stress caused by physical changes in the resin, thus, minimizing cracking and peeling caused by stresses to the multilayer printed circuit board.¹

¹ Applicants' specification at page 16, lines 1-8.

As discussed in the April 7, 2008 amendment, the primary reference to Iwasaki et al. discloses discrete layers of resin and elastomer. Thus, Iwasaki et al. does not disclose that an “elastomer component is provided within the at least one resin ... and the elastomer component is separated in micro-phase so as to form an island-in-sea structure” as recited in Claims 9 and 36. The Office action now acknowledges this deficiency, but cites Koushima et al. as teaching this feature.

Koushima et al. discloses a resin composition used for forming thick molding members. As discussed in Koushima et al., the thermal expansion characteristics of a resin are also disadvantageous in forming a molding member because the mold may shrink, thereby changing critical dimensions of the molded member. To address this problem, Koushima et al. uses a spherical shaped inorganic filler in the resin in order to diminish the physical changes to the molding member as a result of temperature change. In particular, Koushima et al. discloses a resin composition having 30-95 parts by weight of norbornene resin and 5-70 parts by weight of a spherical inorganic filler.

Thus, Koushima et al. discloses spherical inorganic particles within the resin, and not an elastomer component, provided within a resin. Further, the cited reference is completely silent about the state of the inorganic particles within the resin. That is, Koushima et al. does not disclose that the inorganic particles are separated in micro-phase so as to form an island-in-sea structure, as is required for the claimed elastomer component. Therefore, contrary to the position taken in the office action, the combination of Iwasaki et al. and Koushima et al. does not disclose that an “elastomer component is provided within the at least one resin ... and the elastomer component is separated in micro-phase so as to form an island-in-sea structure,” as recited in Claims 9 and 36.

Even assuming that all of the features of the claimed invention can be found separately in the cited references, one of ordinary skill in the art would not combine Iwasaki

et al. and Koushima et al. to arrive at the present invention. First, as noted above, Iwasaki et al. merely discloses an elastomer layer separate from a solder layer on a printed circuit board, without any indication that any substance is provided within the solder layer. Further, while Koushima et al. discloses ***inorganic particles*** mixed with a resin, this disclosure is in the context of molded members, and not circuit boards.

Moreover, there is no hint in either of the references that the inorganic particles in Koushima et al. could or should be used in the resin layer of a printed circuit board, such as that of Iwasaki et al. Perhaps more importantly, neither of the cited references teach or suggest that the inorganic particles should or could be replaced by elastomer in an “island in sea” structure. In fact, Koushima et al. teaches that the inorganic particles are used to reduce thermal expansion and contraction of the molded resin. By contrast, the elastomer component of the claimed invention absorbs the stress of the thermal expansion and contraction in the resin solder resist layer. That is, replacing the inorganic particles of a resin with elastomer would not minimize thermal expansion, but rather address the affects of such expansion and contraction. Thus, replacing the inorganic particles with an elastomer would not achieve the objectives of Koushima et al.

Therefore, one of ordinary skill in the art would not combine Iwasaki et al. and Koushima et al. to arrive at the present invention without the benefit of the disclosure in Applicants’ specification. Thus, Claims 9 and 36 patentably define over Iwasaki et al. and Koushima et al.

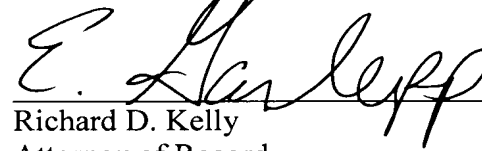
Finally, as noted above, the outstanding Office Action cites Iwasaki et al. and Enomoto et al. in rejecting Claim 36, but does not provide an identification number or copy of this reference. Therefore, there is no evidence to support the rejection, and the Office Action does not provide a *prima facie* rejection of Claim 36.

For the reasons discussed above, Claims 9 and 36 patentably define over the cited references. As the remaining pending claims depend from Claim 9 or 36, these claims also patentably define over the cited references.

Consequently, no further issues are believed to be outstanding in this application, and the present application is believed to be in condition for formal allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read "E. Garlepp", written over a horizontal line.

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